

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier
June 2013

Science A 1

Unit 5

Wednesday 5 June 2013 1.30 pm to 3.00 pm

SCA1FP

F

For this paper you must have:

- a ruler
 - the Chemistry Data Sheet and Physics Equations Sheet Booklet (enclosed).
- You may use a calculator.

Time allowed

- 1 hour 30 minutes

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 90.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 14(c) should be answered in continuous prose.
In this question you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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9	
10	
11	
12	
13	
14	
15	
TOTAL	



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SCA1FP

Answer **all** questions in the spaces provided.

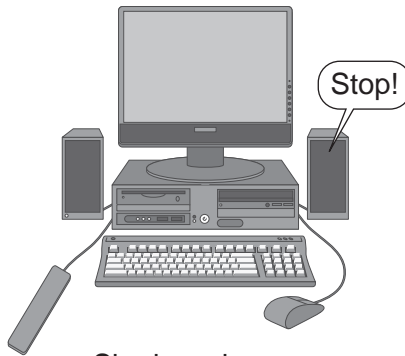
Biology Questions

- 1** A student investigated her reaction time.

A computer measured how quickly she clicked the mouse when she detected each of three different stimuli as shown in the diagrams.



She saw a shape appear on the screen



She heard a man shout 'Stop!'



She felt a bar vibrate in her hand

- 1 (a)** Give the stimulus each sense organ detected in this investigation.

Complete each sentence using the correct word from the box.

chemicals

light

sound

touch

Receptors in her eyes detected

Receptors in her ears detected

Receptors in her skin detected

(3 marks)



- 1 (b)** Each sense organ was tested 4 times and the mean reaction times were calculated.

The table shows the results.

	Reaction time for each sense organ in seconds		
	Eyes	Ears	Skin
Test 1	0.23	0.17	0.18
Test 2	0.27	0.14	0.16
Test 3	0.24	0.15	0.35
Test 4	0.26	0.14	0.17
Mean reaction time		0.15	0.17

- 1 (b) (i)** There is one anomalous result in the table.

Draw a ring around the anomalous result.

(1 mark)

- 1 (b) (ii)** Calculate the mean reaction time for the eyes.

.....
.....

Mean reaction time for the eyes = seconds
(2 marks)

- 1 (b) (iii)** Give **one** conclusion you can make from these results.

.....
.....

(1 mark)

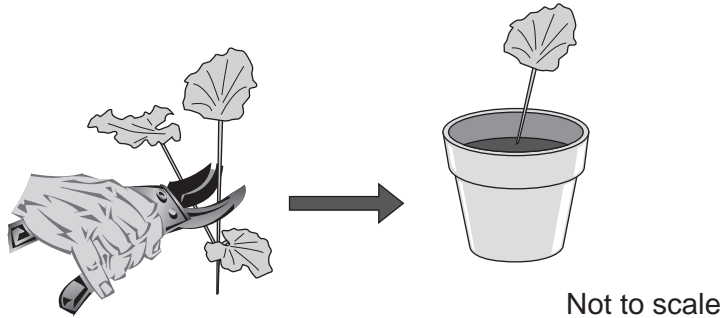
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Turn over for the next question

Turn over ►



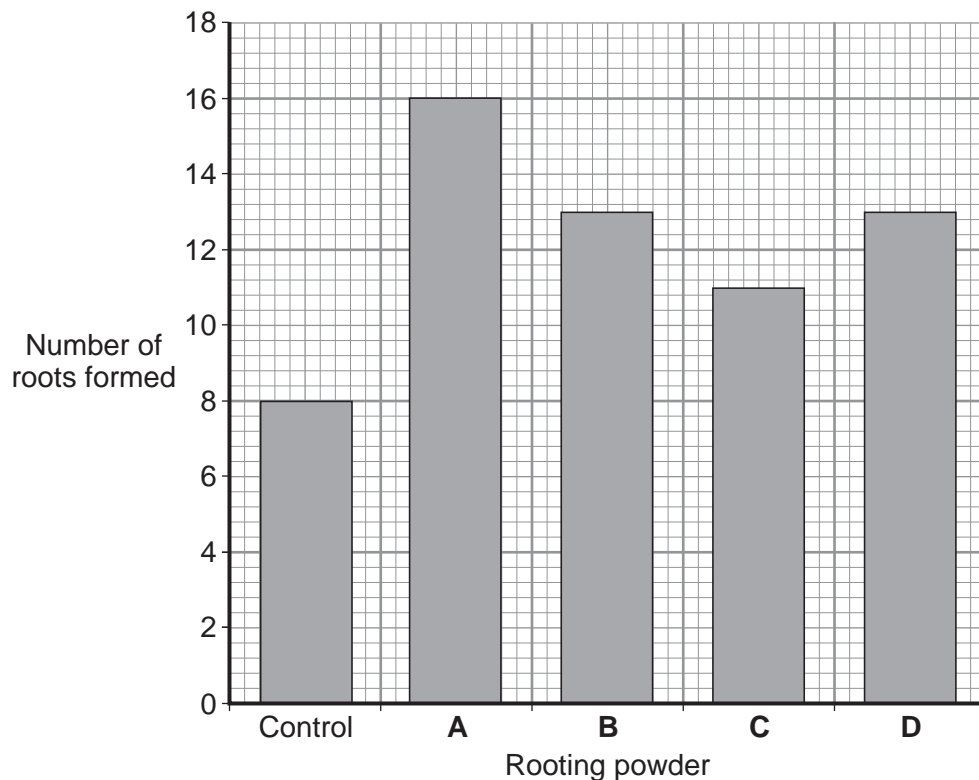
- 2 A gardener wanted to find out which rooting powder, **A**, **B**, **C** or **D**, was the best to use for geranium cuttings.



Cuttings were taken from geranium plants.

- The cuttings were all 8cm long.
- Each cutting was dipped into a different type of rooting powder and then planted in a small pot of soil. A control cutting was also planted.
- The pots were kept in a greenhouse and watered regularly.
- The cuttings were left for 6 weeks.
- The number of roots that had grown on each cutting was counted.

The results are shown in the bar chart.



2 (a) Suggest how the control cutting might have been treated.

Tick (✓) **one** box.

	Tick (✓)
Dipped in all four rooting powders	
Dipped in weed killer	
Not dipped in anything	

(1 mark)

2 (b) (i) How many more roots were formed when the cutting was dipped in rooting powder **D** compared with the control cutting?

.....

.....

(2 marks)

2 (b) (ii) Which rooting powder should the gardener use for his geranium cuttings?

.....

(1 mark)

2 (b) (iii) Name the type of chemical used in rooting powder.

.....

(1 mark)

5

Turn over for the next question

Turn over ►



3 Hormones can be used to control fertility in women.

List A gives the names of three hormones.

List B gives some information about the hormones.

Draw **one** line from each hormone in **List A** to the correct information about the hormone in **List B**.

List A
Hormone

FSH

LH

Progesterone

List B
Information

Used in some contraceptive pills

Causes the womb lining to break down

Stimulates the release of an egg from the ovary

Stimulates eggs to mature in the ovaries

(3 marks)

3



Turn over for the next question

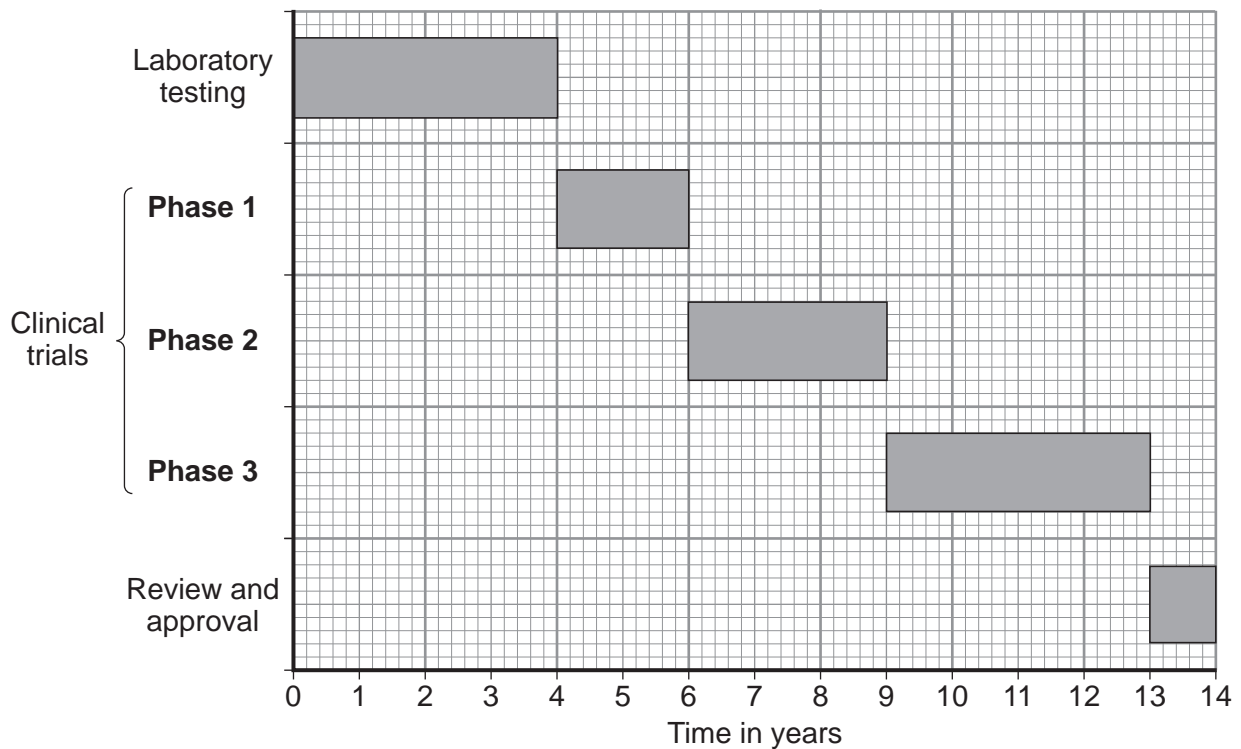
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ANSWER IN THE SPACES PROVIDED**

Turn over ►



4 New drugs have to be tested before they can be sold.

The graph shows how much time the different stages of testing took for a new drug.



4 (a) (i) How much time did the laboratory testing of the drug take?

..... years
(1 mark)

4 (a) (ii) Suggest what the drug was tested on during laboratory testing.

.....
(1 mark)

4 (b) Clinical trials are carried out on human volunteers and patients.

4 (b) (i) How much time did the clinical trials take for this drug?

.....
..... years
(2 marks)



4 (b) (ii) During **Phase 1** clinical trials, the drug is tested on healthy volunteers using low doses.

Draw a ring around the correct answer to complete the sentence.

The reason for **Phase 1** testing is to

find the best dose.

see if the drug works.

see if the drug has side effects.

(1 mark)

4 (b) (iii) During **Phase 2** and **Phase 3** clinical trials, half of the volunteers are given a fake drug called a placebo in a double blind trial.

In a double blind trial, who knows which volunteers are given the drug and which volunteers are given the placebo?

Tick (✓) **one** box.

	Tick (✓)
The doctors but not the volunteers	
The doctors and the volunteers	
The volunteers but not the doctors	
Neither the volunteers nor the doctors	

(1 mark)

6

Turn over for the next question

Turn over ►



Chemistry Questions

- 5** Use the periodic table on the Chemistry Data Sheet to help you answer these questions.

The following is a list of elements.

calcium**carbon****chlorine****copper**

Complete the sentences.

Choose your answers **only** from the elements shown in the box above.

The element with the chemical symbol C is

The element in the same group as fluorine is

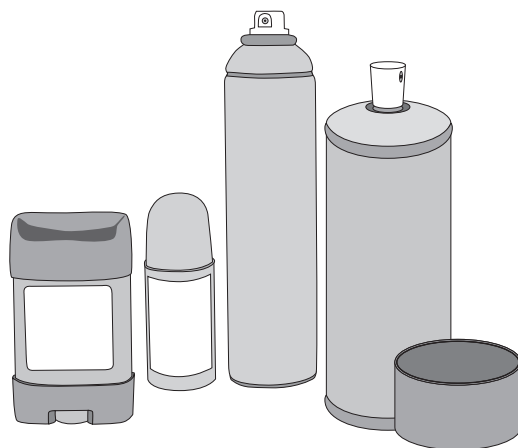
The element with the atomic number of 20 is

(3 marks)

3



6 Aluminium chloride is used in antiperspirants.



6 (a) The formula of aluminium chloride is AlCl_3

6 (a) (i) How many atoms in total are shown in the formula AlCl_3 ?

.....
(1 mark)

6 (a) (ii) How many different types of atom are shown in the formula AlCl_3 ?

.....
(1 mark)

6 (a) (iii) Draw a ring around the correct answer to complete the sentence.

Aluminium chloride is

a compound.
an element.
a mixture.

(1 mark)

6 (b) An aluminium atom contains three different types of particles.

Complete the table to show:

- the relative charge on a proton
- the names of the other two particles.

Name of particle	Relative charge
Proton	
	0
	-1

(3 marks)

6

Turn over ►



- 7** Many sea creatures have shells containing calcium carbonate.

Crab



Whelk



Scallop



- 7 (a)** The seas are becoming more acidic.

Suggest and explain how acids affect the shells of sea creatures.

.....

.....

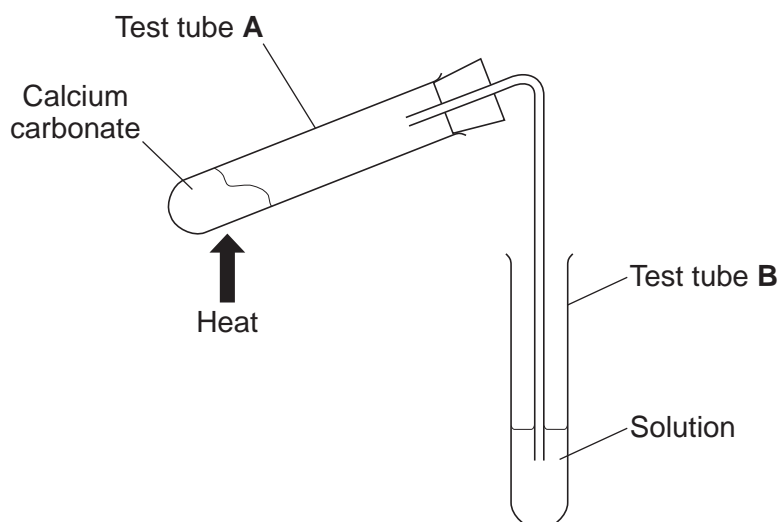
.....

.....

(2 marks)



- 7 (b)** A student investigated the effect of heating calcium carbonate.



- 7 (b) (i)** The symbol equation for the chemical reaction that occurs when calcium carbonate is heated is:



Complete the word equation for the reaction.

..... \rightarrow + carbon dioxide
(1 mark)

- 7 (b) (ii)** 50 g of CaCO_3 produced 28 g of CaO .

What mass of CO_2 was produced?

.....
..... g
(1 mark)

- 7 (b) (iii)** When carbon dioxide passed through the solution in test tube **B**, the solution became cloudy.

Name the solution.

.....
(1 mark)



8 Vehicles need fuel to power them.

Some of these fuels are obtained from crude oil.



8 (a) (i) Draw a ring around the correct answer to complete the sentence.

Crude oil contains many compounds.

Crude oil is

an alloy.

an element.

a mixture.

(1 mark)

8 (a) (ii) Draw a ring around the correct answer to complete the sentence.

Crude oil can be separated into fractions by evaporating the crude oil. The fractions then condense separately.

This process is called fractional

combustion.

decomposition.

distillation.

(1 mark)



8 (b) The different fractions have different properties.

Fraction	Number of carbon atoms	Boiling point range in °C	Flash point in °C
Petrol	5–10	40–180	–43
Kerosene	10–15	180–250	38
Diesel	15–20	250–300	63

Flash point is the lowest temperature at which the fuel will catch fire.

How does increasing the number of carbon atoms affect the boiling point and flash point of the fractions in crude oil?

Complete the sentences.

As the number of carbon atoms increases, the boiling point

.....

As the number of carbon atoms increases, the flash point

.....

(2 marks)

8 (c) Octane is one of the compounds in petrol.

An octane molecule has 8 carbon atoms.

8 (c) (i) Predict the boiling point of octane. °C
(1 mark)

8 (c) (ii) Octane is an alkane. The general formula for alkanes is C_nH_{2n+2}

What is the formula of octane?

.....

(1 mark)



Physics Questions

9 A girl dries her hair using a hairdryer.

The hairdryer is supplied with 1000 J of energy every second.



9 (a) (i) What type of energy is supplied to the hairdryer?

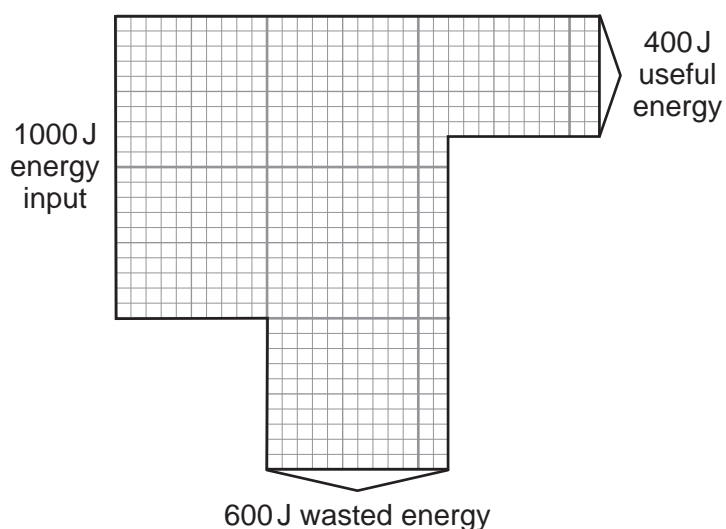
.....
(1 mark)

9 (a) (ii) The hairdryer wastes some energy heating the surroundings.

What other form of energy is wasted by the hairdryer?

.....
(1 mark)

9 (b) The Sankey diagram shows the amount of energy the hairdryer transfers.



What is the percentage efficiency of the hairdryer?

Use the correct equation from the Physics Equations Sheet.

.....

.....

.....

Efficiency = %
(2 marks)

9 (c) Hot air from the hairdryer is used to dry the girl's hair.

Draw a ring around each correct answer to complete the sentences to show why the hairdryer is used.

Energy from the hot air is transferred to the water on the girl's head.

9 (c) (i) The temperature of the water

decreases.

increases.

stays the same.

(1 mark)

9 (c) (ii) The water particles gain energy and move faster.

The water particles with the most

kinetic

light

sound

energy leave the surface of the liquid.

(1 mark)

9 (c) (iii) The hot air from the hairdryer

decreases

increases

does not affect

the time it takes the hair to dry.

(1 mark)

7

Turn over ►

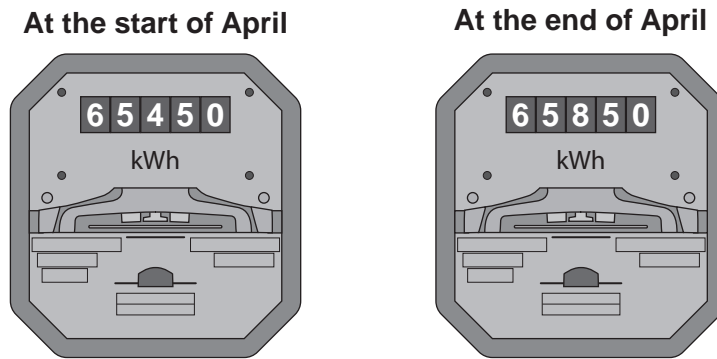


10

A householder wants to reduce her electricity bills.

The householder takes readings from her electricity meter to see how much electricity she is using.

The pictures show the electricity meter readings at the start and end of April in 2013.



10 (a)

How many kilowatt-hours of electricity did she use in April?

.....

.....

Number of kilowatt-hours =
(2 marks)

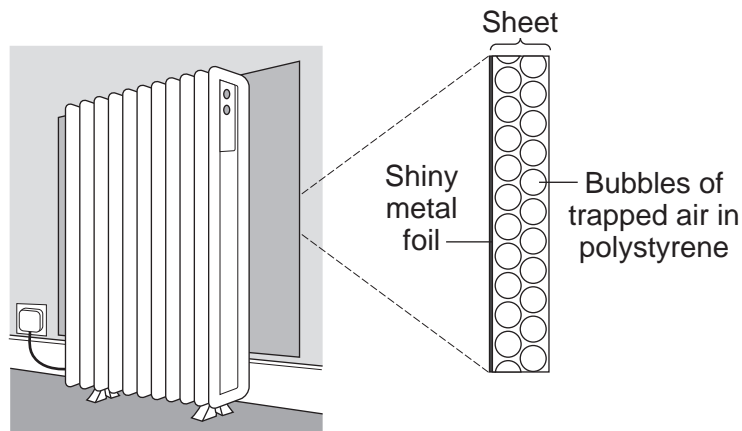
10 (b)

The householder wants to reduce energy transfer from a room so she puts a special sheet between a heater and the wall.

The side of the sheet facing the heater is shiny metal foil.

The side of the sheet facing the wall is polystyrene.

The polystyrene contains bubbles of trapped air.



What properties of the sheet make it good for reducing energy transfer from the room?

Draw a ring around each correct answer to complete the sentences.

10 (b) (i) Shiny surfaces are good

absorbers

emitters

reflectors

of infrared radiation.

(1 mark)

10 (b) (ii) The air in the polystyrene is a good

conductor.

insulator.

emitter.

(1 mark)

10 (c) The householder turns her heater thermostat down by 2°C so the temperature of the room is lower.

The specific heat capacity of air is $1000\text{ J/kg }^{\circ}\text{C}$.

The mass of air in the room is 50 kg .

Calculate the energy needed to change the temperature of 50 kg of air by 2°C .

Use the correct equation from the Physics Equations Sheet.

.....

.....

.....

.....

Energy = J
(2 marks)



11 A student investigates the infrared radiation being emitted by different coloured surfaces to the surroundings.

11 (a) Draw a ring around each correct answer to complete the sentences.

11 (a) (i) All objects emit and absorb
conduct
insulate infrared radiation.

(1 mark)

11 (a) (ii) Compared with cooler objects, hotter objects emit less
the same amount of
more infrared radiation.

(1 mark)

11 (b) The student pours 300 cm^3 of hot water into each of 3 metal cubes and seals the top of each cube.

11 (b) (i) Draw a ring around the correct answer to complete the sentence.

Energy is transferred through the sides of the metal cubes by

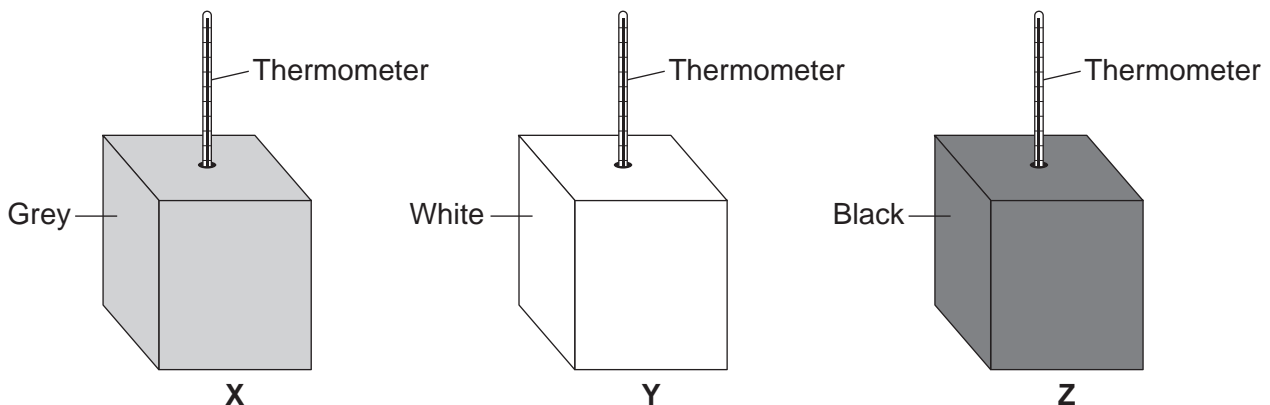
conduction.
convection.
radiation.

(1 mark)

Each cube has the same volume.

Each cube is a different colour.

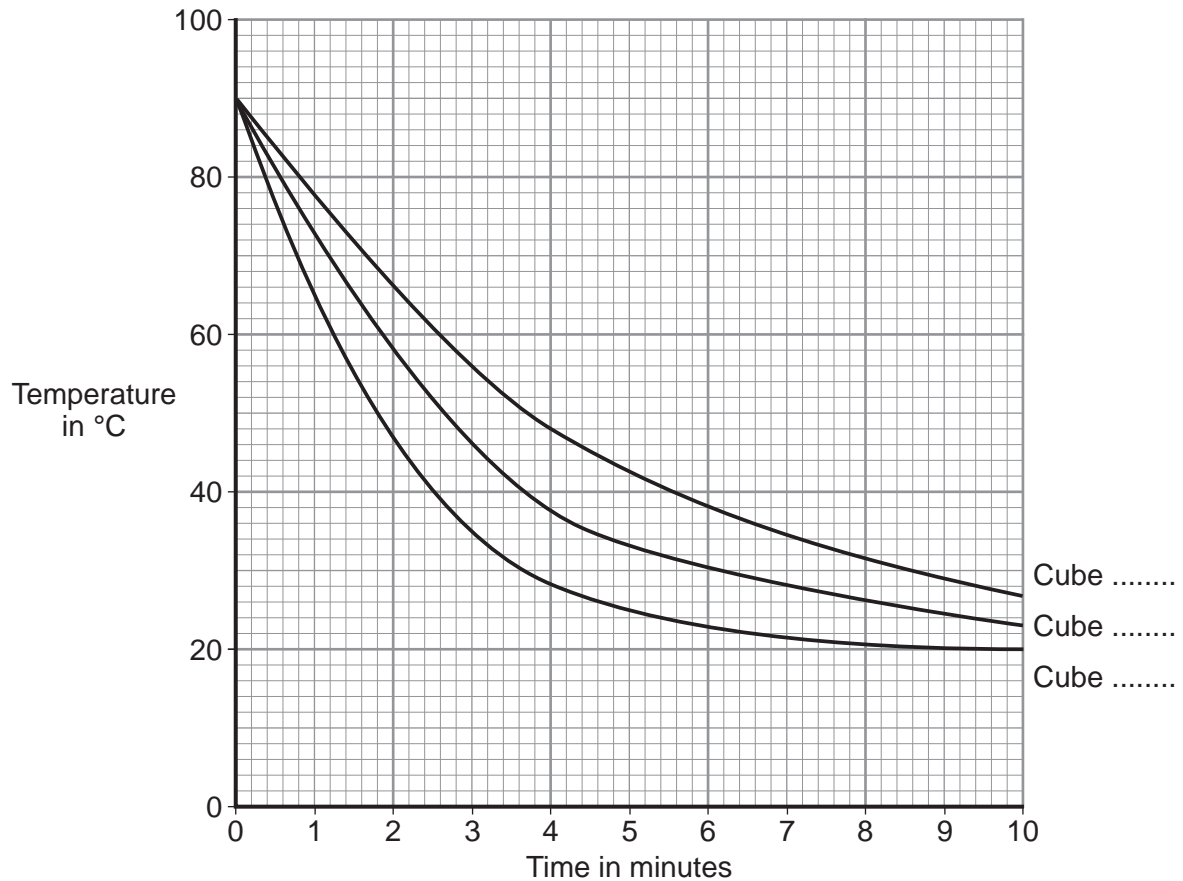
The temperature of each cube is recorded over 10 minutes.



11 (b) (ii) What is the independent variable in the investigation?

.....
(1 mark)

The results of the investigation are shown on the graph.



11 (b) (iii) Write the correct letter for each cube, **X**, **Y** or **Z**, next to the lines shown on the graph.

(2 marks)

11 (b) (iv) All three cubes had the same starting temperature. This was important in the investigation.

Suggest why.

.....
.....
(1 mark)

11 (b) (v) Some variables are kept the same in an investigation.

What name is given to these variables?

.....
(1 mark)



Biology Questions

- 12** A healthy diet gives the right balance of different foods you need and the right amount of energy.



- 12 (a)** Give **two** possible effects on the body of a diet that is **not** balanced.

1

2

(2 marks)

- 12 (b)** The food we eat can affect how much cholesterol is in the blood.

Give **one** other factor that can affect how much cholesterol is in the blood.

.....

(1 mark)

- 12 (c)** Eating a balanced diet can help people to stay healthy.

What else can people do to stay healthy?

.....

.....

(1 mark)



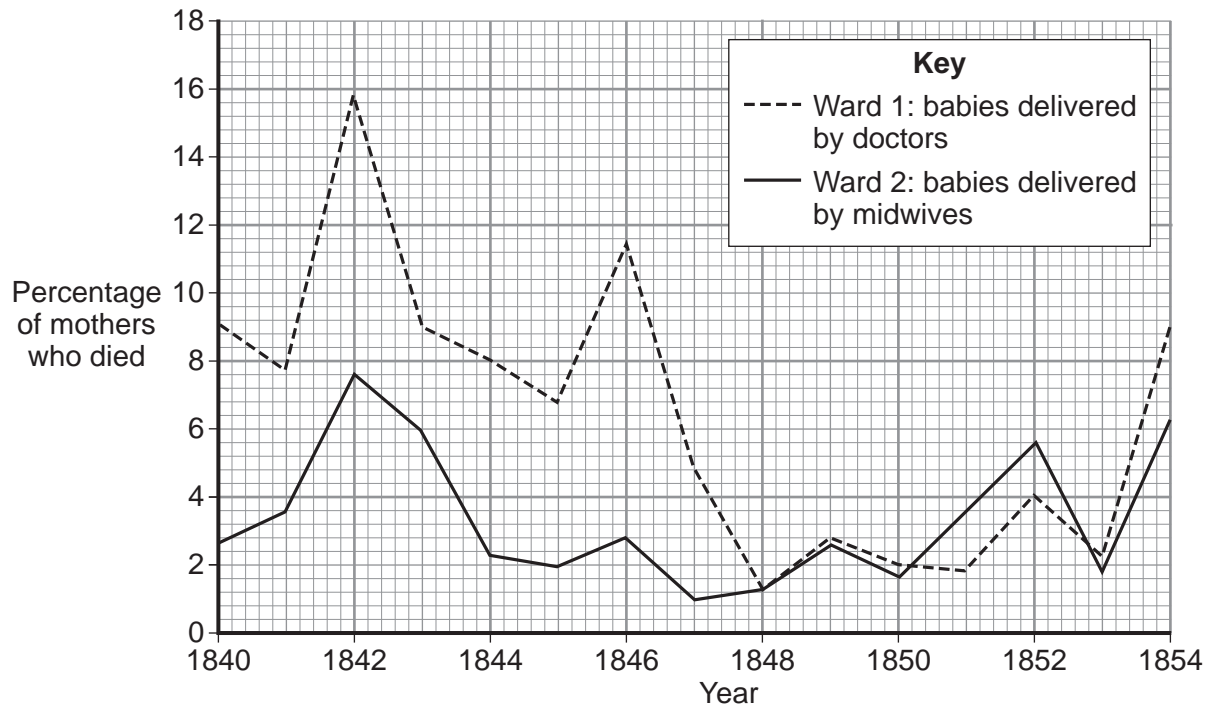
13

In the 1800s, many women died in hospital of childbed fever after giving birth.

The graph shows the percentage of mothers who died from childbed fever each year in a hospital in Vienna.

Death rates are shown for two wards at the hospital.

- In **Ward 1** doctors delivered the babies. The doctors worked in many different wards. The doctors also carried out investigations on dead bodies.
- In **Ward 2** midwives delivered the babies. The midwives only worked in **Ward 2**.



13 (a)

What conclusion can be made from the data between 1840 and 1846?

.....

.....

Suggest a reason for this.

.....

.....

(2 marks)

Question 13 continues on the next page

Turn over ►



13 (b) Ignaz Semmelweis was a doctor at the hospital. He was very worried about the number of women who died after child birth.

In 1847, Semmelweis introduced a new policy. This policy led to a reduction in the number of deaths.

13 (b) (i) What policy did Semmelweis introduce?

.....

.....

.....

.....

(2 marks)

13 (b) (ii) Suggest why this policy led to a reduction in the number of deaths.

.....

.....

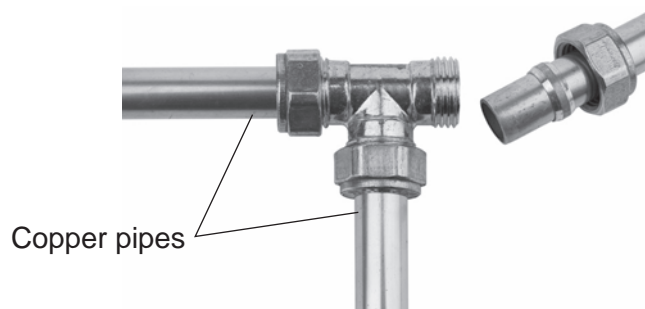
(1 mark)

5



Chemistry Questions

- 14** Copper is used in plumbing.



- 14 (a)** Complete the following sentence.

Elements in the central block of the periodic table, eg copper, iron and zinc, are called
..... metals.

(1 mark)

- 14 (b)** State three properties that make copper suitable for use in plumbing.

- 1
-
- 2
-
- 3
-

(3 marks)

Question 14 continues on the next page

Turn over ►



- 14 (c)** *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Copper can be extracted from copper ores by two methods:

Method 1 mining and smelting

or

Method 2 phytomining.

The main stages in the two methods are shown in the flow diagrams.

Mining and smelting



The copper ore is mined from the earth.



The copper ore is heated in a furnace with carbon (smelting).
This produces impure copper.

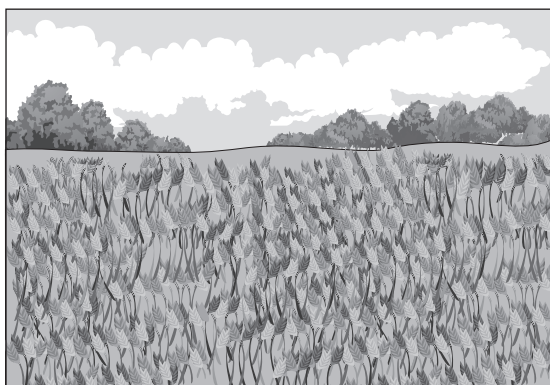


The copper is purified by electrolysis.



Pure copper is produced.

Phytomining



Plants are grown on soil containing low grade ores.



The plants absorb copper compounds from the soil.



The plants are burned.
The ash contains copper compounds.



Copper is extracted from a solution made from the ash by electrolysis.



Pure copper is produced.



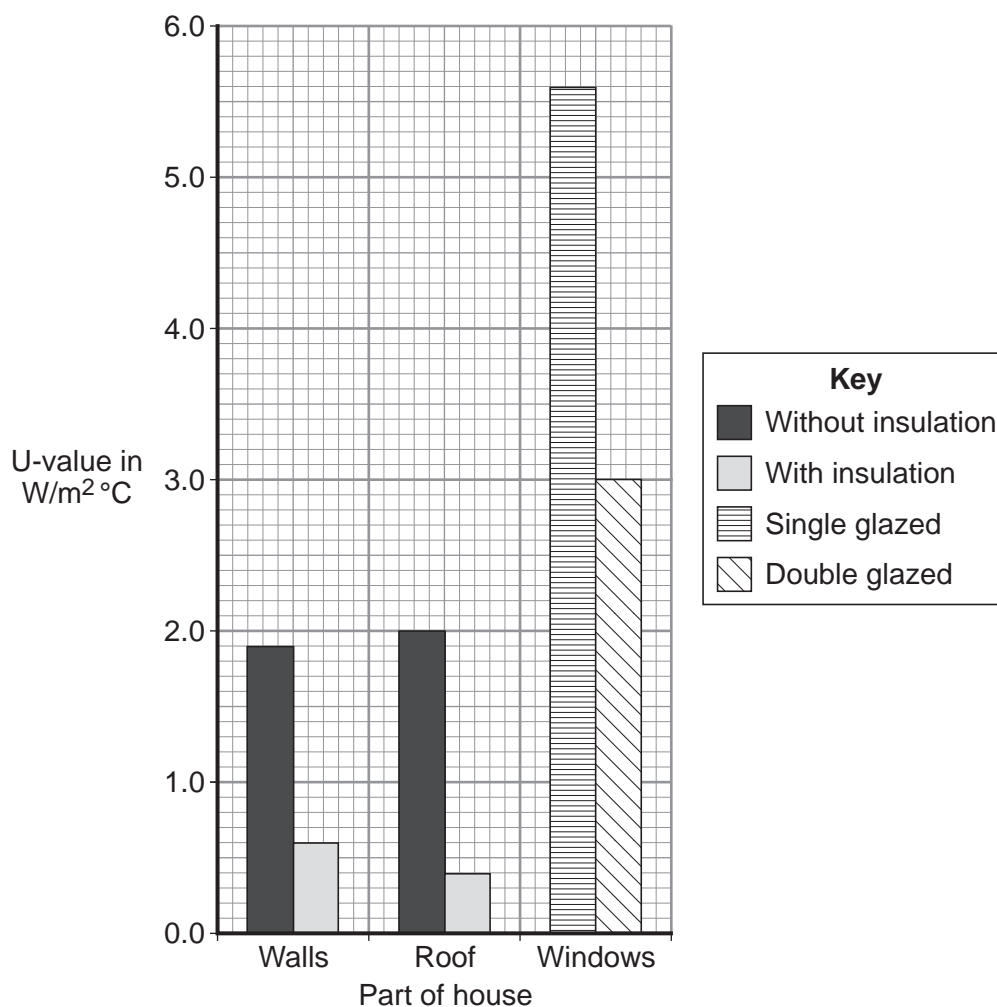
Remember to include a conclusion in your answer.

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10

Physics Questions

- 15** A salesman for a double-glazing company shows the following bar chart to possible customers. The bar chart shows U-values for different parts of a house.



- 15 (a) (i)** What type of variable is 'Part of house'?

Draw a ring around the correct answer.

categoric

control

continuous

(1 mark)



15 (a) (ii) It is better to build houses using materials with low U-values.

State why.

.....
.....

(1 mark)

15 (b) The salesman says, "Double glazing is twice as good an insulator as single glazing".

The salesman is incorrect.

Explain why.

Use information from the bar chart to support your answer.

.....
.....
.....
.....
.....

(2 marks)

Question 15 continues on the next page

Turn over ►



- 15 (c)** A customer's house is shown in the diagram.



Area of roof = 72 m^2

Area of walls = 140 m^2

Area of windows = 24 m^2

U-values are calculated using areas of 1 m^2 .

What should the customer consider before deciding which part of the house to insulate first?

.....

.....

.....

.....

.....

.....

(3 marks)

- 15 (d)** In a magazine, the customer reads:

'Roof insulation is a good idea because hot air rises.'

Explain why air rises when it is heated.

.....

.....

.....

.....

(2 marks)

END OF QUESTIONS



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